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Dixon, J.R. and R.L. Tipton. 2008. *Liophis jaegeri*.

Liophis jaegeri (Günther) Jaeger's Swamp Legion Snake; Culebra Verde de Vientre Rojo; Cobra d'Agua Verde; Cobra-Verde

Coronella jaegeri Günther 1858:37. Type-locality, "Brazil." Syntypes, The Natural History Museum, London (BMNH) 1946.1.9.12, 1946.1.5.78, adult females, collector and date of collection unknown (examined by authors).

Liophis (*Ophiomorphus*) *dorsalis* Peters 1863:283. Type-locality, "Brazil." Syntypes, Berlin Museum (3), numbers unknown and specimens may have been destroyed during World War II.

Aporophis coralliventris Boulenger 1894:346. Type-locality, "island north of Concepcion, near San Salvador, north Paraguay". Holotype, British Museum of Natural History (BMNH) 1946.1.5.85, age and sex, collector, and date of collection unknown (not examined by authors).

Rhadinaea lineata Jensen 1900:105.Type-locality, "Taboleiro Grande, Minas Gerais, Brazil" [Peters and Orejas-Miranda (1970) show the type-locality to be Lagoa Santa, Minas Gerais, Brazil.] Holotype, Zoological Museum University Copenhagen (ZMUK) 601263, adult male, collector and date of collection unknown (examined by authors).

Liophis jaegeri: Amaral 1926:78. First use of present combination.

• **CONTENT**. Two subspecies are currently recognized: *Liophis jaegeri coralliventris* and *L. j. jaegeri*.

• **DEFINITION**. Dixon (1987) examined 415 individuals of *L. jaegeri* and full data was taken on 158 of these; tail/total length ratios were recorded for over 400 individuals. The maximum total length of males is 539 mm, of females 676 mm. Dorsal scales are smooth, in 17 rows, normally without reductions, and without apical pits. When reductions are present (15 of 160 individuals), they occur with a fusion of scale rows 3 and 4 on one or both sides of the body, reducing to 15 or 16 between ventrals 88 and 141 (mean = 121.2). Sexual differences in number of ventrals, subcaudals, maxillary teeth, and tail/total length ratios are absent, therefore samples were combined for statistical analysis. However, for those who wish to have the males and females separated for their own analysis, male ventrals vary from 150–166 (n = 70, mean = 158.7), females 146–169 (n = 88, mean = 156.2); male subcaudals vary from 54–75 (n = 70, mean = 63.5), females 52–73 (n = 68, mean = 60.5). The number of ventrals of 158 individuals varies from 146–169 (mean = 157.5), and subcaudals from 52–75 (mean = 61.7) for sexes combined; the number of maxillary teeth varies from 22–29 (mean = 25.6). Tail/total length ratios vary from 0.181–0.268 (mean = 0.221). Number of palatine and pterygoid teeth were recorded for one individual and they were 10 and 25 respectively. Head scales are as follows: supralabials 6–7 (1), 7–7 (1), 7–8 (4), 8–8 (147), 8–9 (4), 9–9 (1); supralabials entering the orbit 3+4 (1), 3+4/4+5 (3), 3+4+5/4+5 (1), 3+4+5/4+5+6 (1), 4+5 (148), 4+5/4+5+6 (2), 4+5+6 (1); infralabials 8–8 (3), 8–9 (4), 8–10 (2), 9–9 (5), 9–10 (24), 9–11 (1), 10–10 (112), 10–11 (5); preoculars 1–1 (155), 1–2 (2), 2–2 (1); postoculars 2–2 (all); loreals 1–1 (all); temporals 1+1 (5), 1–1/1-2 (11), 1+2/2+1 (1), 1+2 (141); eye diameter/snout length ratios of 20 adults vary from 0.533–0.844 (mean = 0.655). The anal plate is divided in all specimens. Hemipenial length varies from 7–13 (mean = 10.3) subcaudals. The hemipenis extends 12 subcaudals with the sulcus spermaticus divided at the level of the 6th subcaudal, and lobes beginning at the level of the 9th subcaudal. Large spines occur on the asulcate side of the hemipenis to the edge of the large, smooth, apical disk. Calyces appear to be absent and only a weak basal naked pocket is present.

FIGURE 1. *Liophis jaegeri*, Estado do Rio Grande do Sul, Brazil. Photograph by Marcos Di-Bernardo.

The general dorsal color is dull green, olive-green, or olive-brown. In life, the venter is normally rose or coral red, with or without lateral dark marks on the edges of the ventrals. There is a reddish-brown to olive-brown stripe covering scale rows 8–12, and frequently parts of scale rows 7 and 13. The stripe varies in width from 5 to 10 rows of scales. Occasionally dark brown spots occur on the posterior edge of rows 3, 4, 5, and sometimes along scale rows 7 and 8. The upper and lower lips, throat and anterior ventrals may be cream or yellowish.

• **DIAGNOSIS**. *Liophis jaegeri* is distinguished from all *Liophis*, except *L. problematicus* and *L. williamsi*, by having dorsal scale rows numbering 17–17–17, without reduction. It differs from *L. problematicus* and *L. williamsi* by having 8 supralabials and a relatively uniform leaf green to olive green dorsum. Occasionally, a reddish brown to pinkish red stripe occurs on scale rows 8–12 the entire length of the body. In preservative there occasionally appears to be three pale stripes on the body. According to Amaral (1978), color in life consists of "a greenish dorsum with coppery reflection, sometimes with small brownish blotches on each side". Of the other species of "green *Liophis*" (*L. typhlus; L. viridis, L. guentheri, L. maryellenae*,

and *L. atraventer*), none have scale rows without reduction, and none have 17 scale rows anteriorly or at midbody.

• **DESCRIPTIONS**. Detailed descriptions appear in Boulenger (1894), Cei (1993[1994]), Dixon (1987), Guirado (2001[2002]), Günther (1858), Jensen (1900), Peters (1863), Tipton (2005), and Williams and Scrocchi (1994).

• **ILLUSTRATIONS**. Amaral (1978), Cei [1993 (1994)], Giraudo (2001), and Obst et al. (1988) provided color photographs, and Boulenger (1896) black-and-white drawings.

• **DISTRIBUTION**. This species is known from southeastern Brazil to coastal Uruguay, and the Río Paraná Basin of Argentina, Brazil, Paraguay, and has recently been found in Bolivia. It occurs about 19°S latitude in Brazil, to about 35°S latitude in Uruguay and Argentina, westward to about 61°W longitude, along the Río Paraguay Basin in Argentina, Paraguay and Brazil. Dirksen et al. (1995) reported the first record for *Liophis jaegeri* in Bolivia.

Map. Distribution of *Liophis jaegeri*. The type-locality is too imprecise to plot.

• **FOSSIL RECORD**. None.

• **PERTINENT LITERATURE**. Miranda et al. (1982) and Amaral (1978) provided descriptions of color in life; Cei [1993(1994)], Dixon (1985, 1987, 1989), and Giraudo (2001) contain distribution maps. Habitat preferences are discussed by Amaral (1978), Dixon (1987), Lema (1994), and Miranda et al. (1982); Eterovic and Duarte (2002) evaluated perceptions of snakes, including this species, in Brazil; and Arzamendia and Giraudo (2004) included this species in an analysis of Chilean protected areas. Other papers are listed by topic: **anatomy and venoms** (Anthony 1935), **common names** (Gatti 1955; Tipton 2005), **cranial osteology** (Fabian 1971), **diet** (Amaral 1978; Di-Bernardo 2005; Frota and Di-Bernardo 2004; Gallardo 1977; Lema 1983; Miranda et al. 1982; Solé and Kwet 2003; Yanosky et al. 1996), **faunal treatments** (de Paulo Koproski 2005; Giraudo and Quaini 1997; Giraudo and Scrocchi 2002; MRS 2004; Quintela et al. 2006; Serié 1936; Williams and Scrocchi 1994; Zanella and Cechin 2006), **herpetoculture** (Calleffo and Fernandes 2000a,b), **parasites** (Carini 1933a,b; Galaviz-Silva and Jimenez-Guzman 1986, 1990), **reproduction** (Di-Bernardo 2005; Dixon 1987; Miranda et al. 1982; Vaz-Ferreia et al. 1970, 1973, 1976).

• **REMARKS**. Dixon (1985) presented evidence that *L. jaegeri* and *L. maryellenae* hybridize in an area near Belo Horizonte, Minas Gerais, Brazil. Additional material from the area has not been located and the hybrid zone remains undefined.

Dixon (1987) grouped 158 individuals of this species into 9 geographic samples. Three samples were located in the Río Paraguay basin in a north/south line, and 6 samples were scattered from Uruguay to southeastern Brazil, more or less in a north/south line. Using univariate statistics, the number of ventrals, maxillary teeth, subcaudals, and tail/total length ratios were analyzed for intra- and inter-sample variation. In addition, Student's t-Test values were used to determine significance at the 95% level, in a pair-wise sample comparison. No significant differences in pair-wise comparisons exist for any of the samples arranged in the two north to south lines. There are trends in both lines to increased number of ventrals and subcaudals from north to south. The trend for maxillary teeth is reversed, with numbers decreasing from north to south. Pair-wise comparisons for the Student's t-Test values for the number of ventrals, maxillary teeth and tail/total length ratios of eastern and western samples were not significant. However, a significant difference between eastern and western samples in the number of subcaudals exist. Subcaudals of the combined 3 western samples vary from 63–75 (mean = 68.5, 3.8 SD, 0.9 SE), while the combined 6 eastern samples vary from 52–71 (mean = 60.4, 3.4 SD, 0.3 SE). The tail/total length ratios of the western samples vary from 0.214–0.268 (mean = 0.231, 0.29 SD, 0.07 SE) and those of the eastern samples from 0.193–0.248 (mean = 0.221, 0.13 SD, 0.01 SE). This suggests that the subcaudals are smaller in the western sample, hence more subcaudals are present on a tail about the same length as in the eastern sample. The eastern and western samples are separated by the Río Uruguay and Río

Paraná Basin and appear to be allopatric. Since the number of subcaudals were demonstrated to be significantly different between the two samples, Dixon (1987) proposed recognition of the subspecies *L. jaegeri jaegeri* and *L. jaegeri coralliventris*.

• **ETYMOLOGY**. The species is named after Georg Friedrich von Jäger (1785–1866) of Stuttgart, a collaborating naturalist who was a friend of Günther. The name *coralliventris* is from the Latin words "corallum", a red color, and "venter", meaning belly; the combination refers to the red-belly of this snake.

1. *Liophis jaegeri jaegeri* Günther 1858. See species synonymy.
Jaeger's Swamp Legion Snake; Culebra Verde de Vientre Rojo

• **DEFINITION**. The dorsum is olive-green, grayish-green, or leaf green, often with a middorsal brownish or reddish stripe six to eight scale rows wide, sometimes with dark dots along scale row four, and occasionally along scale rows three and five. Venter is rose to reddish, with or without ventrolateral black marks on the edges of the ventals. Subcaudals vary from 52–71 (mean = 60.4).

• **DISTRIBUTION**. Known from the east side of the Río Paraná Basin eastward to the Atlantic coast, and from coastal Uruguay northward to 19°S latitude in southeastern Brazil.

2. *Liophis jaegeri coralliventris* (Boulenger 1894). See species synonymy.
Boulenger's Red-bellied Swamp Legion Snake

• **DEFINITION**. This is a small, thin snake and the dorsum ground color is leaf green, sometimes with a middorsal brownish-red stripe five to six scale rows wide, extending from the nape to the tail, and with a dark brown line on scale row three to each side of the body. Venter is rose to red, with or without ventrolateral blackish marks on the edges of the ventrals. Subcaudals vary from 63–75 (mean = 68.5).

• **DISTRIBUTION**. Known only from the Río Paraná Basin of Argentina, Brazil, and Paraguay.

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